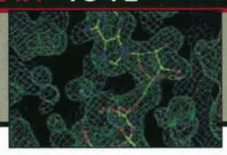
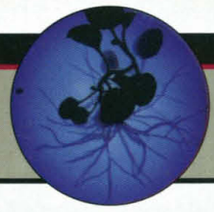




The fault continues west from the ruptured area, diving under the Sea of Marmara and skirting 30 kilometers from Istanbul. "If there's any stress transfer mechanism, it's scary," says Toksöz. "We are convinced that the next segment is locked, it's a seismic gap, and it's sitting right next to Istanbul, with 12 million people." Toksöz is planning to extend his network of GPS stations to this next fault segment, to monitor any buildup of stress that might indicate that the seismic activity on the North Anatolian fault is about to take another mighty step to the west. **–TIM APPENZELLER**

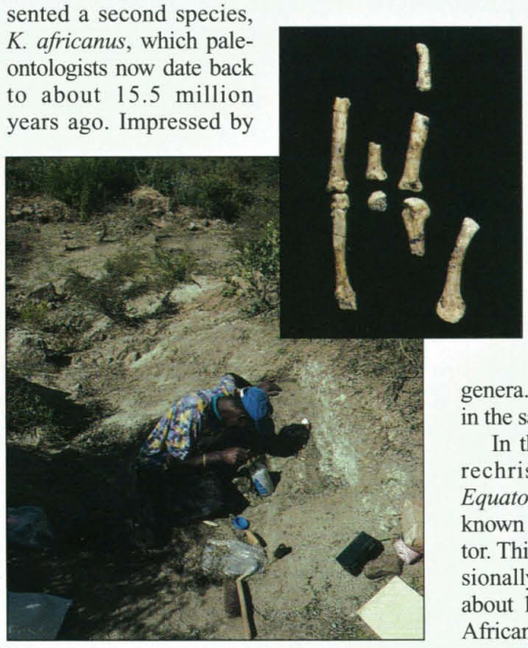
PALEOANTHROPOLOGY

Kenyan Skeleton Shakes Ape Family Tree

In the summer of 1993, fossil hunter Boniface Kimeu walked down a slope in the Tugen Hills of north central Kenya and noticed a single tooth sticking out of a wall of rock. He returned with other researchers from the Baringo Paleontological Research Project, who worked their way deeper into the rock and discovered a jaw with more teeth, plus bones from the spine, rib cage, arms, wrists, and hands. Kimeu had found the most complete ape fossil known from about 11 million to 16 million years ago—a crucial transition time when primitive apes looking something like howler monkeys were evolving into the ancestors of the living great apes, including humans. Now, after 6 years of preparation and study, a research team presents the find on page 1382 of this issue. Paleontologists say it shines light into an extremely murky phase of ape evolution, forcing researchers to reexamine the family tree of our distant ancestors and offering a glimpse of new connections across continents.

Initially the research team, led by paleoanthropologist Steve Ward of the Northeastern Ohio Universities College of Medicine in Rootstown, Ohio, thought the skeleton belonged to a 15-million-year-old primate called *Kenyapithecus*, a controversial genus once considered the ancestor of modern apes. But closer analysis proved this idea only partly correct. The team now argues that the new fossils, as well as some previously collected specimens of *Kenyapithecus*, are actually so different from the original *Kenyapithecus* fossils that they belong in an entirely new genus. The new primate, which the team calls *Equatorius*, is not a close relative of living apes after all, but it does record apes' first steps down from the trees—a crucial evolutionary step that our own ancestors must have taken independently. And the reclassification suggests that *Kenyapithecus* was part of a great migration of apes out of Africa. The new find is "extremely important," says David Begun, a paleoanthropologist at the University of Toronto. Adds paleoanthropologist Peter Andrews of The Natural History Museum in London: "It shows general evolutionary patterns in Africa and a migration between Africa and Europe and Asia. That's a lot from just one new name."

Kenyapithecus was first discovered by pioneering paleontologist Louis Leakey in 1961. At a site called Fort Ternan in western Kenya, he found an upper jaw and a few teeth dating back 14 million years, which he dubbed *Kenyapithecus wickeri*. Then in 1965 he sifted through bits of jaw and teeth from Maboko Island in Lake Victoria, 100 kilometers away, and decided that they represented a second species, *K. africanus*, which paleontologists now date back to about 15.5 million years ago. Impressed by its modern-looking teeth, Leakey declared *Kenyapithecus* to be "a very early ancestor of man himself."



Hand from the past. Boniface Kimeu unearthed a partial ape skeleton in Kenya's Tugen Hills, including the bones of the hand.

Since then, as paleontologists have gathered more data on the evolution of apes—the lineage of large primates that includes humans, chimps, gorillas, and orangutans—they have argued about where *Kenyapithecus* fits into the picture. The first apes seem to have arisen from monkeylike primates in African forests more than 20 million years ago, and by 10 million years ago they had blossomed into a huge radiation reaching across Europe and much of Asia. But sometime in the next 10 million years, almost all went extinct.

Kenyapithecus, with its scant fossil record but intriguing teeth, has been cast in many different roles in this story. A few researchers stand by Leakey's original idea (*Science*, 18 April 1997, p. 355), but many consider *Kenyapithecus* to be more primitive. They see our own roots in later European apes, which might have evolved from *Kenyapithecus*.

The new fossil suggests that both sides might be right, because it shows that *Kenyapithecus* is not one genus but two. Ward recognized the split thanks to the nearly complete set of teeth of the new find, particularly the canines and incisors, which set it apart from *K. wickeri*. "That was the catalyst that caused us to carefully reassess everything else, and everything else just about fell into place," says Ward. When they looked with fresh eyes at the specimens assigned to *Kenyapithecus*, they realized that the new fossil and other *K. africanus* material lacked many of the distinctive features of *K. wickeri*, including details of the canines. They conclude that *K. africanus* and *K. wickeri* were profoundly different apes, belonging to two separate genera. "Everything we tried kept pointing in the same direction," says Ward.

In their report, the researchers therefore rechristen *Kenyapithecus africanus* as *Equatorius africanus*, so named because all known specimens come from near the equator. This was the earliest known ape to occasionally leave the treetops for the ground, about 15 million years ago when the dense African rainforests began to turn into a more open woodland, says Jay Kelley, a co-author from the University of Illinois, Chicago.

The new fossils, together with previously collected specimens, give a clearer picture of the functional changes made by this pioneer. In Ward's words, it was "an animal about the size of a big adult male baboon, an animal whose arms and legs were about equivalent length, with a long, flexible vertebral column and powerful grasping hands and feet. We're dealing with an animal that spent considerable time on the ground but

CREDITS: S. WARD *ET AL.*

also used the trees a great deal."

Meanwhile, *K. wickeri* shows tantalizing similarities with modern apes. "We're looking at *Equatorius* on one side of the divide and *wickeri* on the other," says Ward. His team sees links in *K. wickeri* to Eurasian fossils, in particular, a still-unnamed 14-million-year-old ape found at a site called Paşalar in Turkey. That link may mean that *K. wickeri* was "a participant in the [early] radiation out of Africa," says Ward.

This new view of *Kenyapithecus* has "very important implications for the whole picture of [ape] evolution," says Carol Ward (no relation to Steve) of the University of Missouri, Columbia. Comparing two genera allows researchers to study the arrow of evolution from primitive to derived traits, she says.

But not everyone agrees with all of Steve Ward and colleagues' interpretations. Begun, for example, thinks that *Equatorius*, rather than *Kenyapithecus*, may resemble the ancestral ape that migrated out of Africa. He is now preparing a report on a 16-million-year-old German fossil of an ape called *Griphopithecus*, which looks much like *Equatorius*. That would suggest that the first ape to migrate out of Africa was a much more primitive, earlier branch. "It's really *Equatorius* that shows the earliest connection [to Europe]," argues Begun.

Meanwhile, the crucial question of which ape made it through the Miocene to give rise to the living great apes and humans remains a mystery. Indeed, by erasing *K. africanus*, Ward and his colleagues have reduced one contender, *Kenyapithecus*, to little more than the handful of teeth that Leakey found at Fort Ternan. "It's tempting and tantalizing to think of *Kenyapithecus* as an early member within the great ape clade, but we really can't say that at this point. The material at Fort Ternan is just too limited," says Kelley. For that, paleontologists will have to wait for Kimeu or some other sharp-eyed fossil hunter to find more complete fossils, skeletons whose parts may eventually let them make sense of the whole. **–CARL ZIMMER**

Carl Zimmer is the author of *At the Water's Edge*.

RESEARCH RISKS

California Probes Prison Teens Study

BERKELEY, CALIFORNIA—A study in California of an antiviolence drug given to incarcerated teenagers, which was recently hailed as a model for work with such a rarely studied population, is now under attack for possibly violating laws to protect inmates involved in medical research. The investigation centers on whether the research met legal requirements that all inmates in a study have a reasonable chance of benefiting from their participation.

In 1996 Stanford University psychiatrist Hans Steiner set out to measure whether divalproex sodium (Depakote), an antiepilepsy drug that is already widely used to treat violence in teenagers, is actually effective for that use. Steiner conducted the study at the O. H. Close Youth Correctional Facility in Stockton, where he has worked with youths for 15 years. Seventy teenaged boys whose aggressive violence fit a psychiatric condition called conduct disorder were divided into two groups and given different doses of the drug for 7 weeks. Steiner says boys in both groups showed a "reduction of distress" during the trial, and the high-dose group had a moderately increased ability to control violent urges. The study was funded by Abbott Laboratories and the California Youth Authority (CYA), which runs the facility.

Studies like Steiner's, in which drugs are tested on teenaged inmates, are "very, very rare," says Markus Kruesi, a child and adolescent psychiatrist at the Institute for Juvenile Research of the University of Illinois, Chicago. Kruesi hailed Steiner as a pioneer last fall when he introduced Steiner's work at the annual meeting of the American Academy of Child and Adolescent Psychiatrists (AACAP) in Anaheim, California. Steiner says he hoped his presentation would encourage more colleagues to follow in his footsteps. "Child psychiatrists are remarkably absent in these institutions," he says. "I think it's a mistake."

The still unpublished work caught the eye of new CYA director Greg Zermeño in March after Steiner applied to do a follow-up study on its long-term effects. Zermeño opened an investigation after declaring that there had been a breakdown in his office's review process when the project was approved. Governor Gray Davis has ordered the state inspector general to investigate, and the CYA has asked the state attorney general's office to help with its review. Kathy McClelland, Stanford's research compliance director, says the study protocol was approved by the university's institutional review board, and Stanford assumed that CYA had done its own review. Thomas Puglisi, director of human subject protection at the National Institutes of Health, says his office is following the progress of the state investigations but has no plans to do its own. Puglisi noted that Steiner appears to have gone beyond legal requirements for informed consent by obtaining parental approval and assigning advocates to the boys.

The controversy, first reported in the *Los Angeles Times* on 16 August, centers largely on the issue of whether subjects receiving the low dose could reasonably have

CREDIT: NICK COBBING

ScienceScope

Saber-Rattling In a move that one researcher calls a "crude attempt to intimidate," an environmental group is warning British scientists and biotech executives that they could be personally liable for damages caused by genetically modified (GM) crops. Friends of the Earth (FOE) chief Charles Secrett last month sent letters to officials at more than 30 companies, research centers, and universities, warning that they could be "legally liable" for allergies or other problems caused by GM crops.

But in a public response, one of FOE's targets last week said the threat is misdirected. Accusing the group of "deep ignorance," Donald O'Nions, administrative head of the John Innes Centre in Norwich, said that his institute does basic research, not plant development.

Still, FOE believes that individual researchers "should not be able to hide behind a corporate veil," says Secrett. Whether FOE can make good on its threat, however, is in doubt. In general, European laws do not hold employees personally liable for damages caused by their companies.

Testing, Testing The debate over animal testing in India took a new turn this week when a court gave permission for a biotech company to resume testing of its immune-system drug on a new batch of monkeys. The ruling comes 2 weeks after an earlier test was disrupted by the government-sanctioned release of 50 monkeys from a national facility that failed to meet new animal welfare rules (*Science*, 13 August, p. 997).

Shantha Biotechnics in Hyderabad claims it lost $25 million due to the 9 August raid, which freed monkeys from the National Center for Laboratory Animal Sciences (NCLAS). The High Court of Andhra Pradesh in Hyderabad has now ruled that the tests can resume with new animals—and "no interference" from animal welfare organizations.

Varaprasad Reddy, Shantha's managing director, says he is "relieved and happy" with the order. But he says it fails to address a government split which pits the Animal Welfare Board against the Indian Council of Medical Research. And the Blue Cross Society, which was instrumental in the raid, says it is not opposed to testing if NCLAS improves living conditions for the monkeys.

Contributors: Erik Stokstad, Pallava Bagla